In the Specification

Substitute the specification enclosed herewith for the specification presently pending.

The substitute specification contains no new matter.

In the Claims:

Cancel claims 1 through 95 without prejudice.

Add claims 96-139 as follows:

96. A microproportioning system, comprising:

- a reservoir;
- a micro-diaphragm pump having an entrance connected to the reservoir;
- a proportioning port connected to an exit of the micro-diaphragm pump; and
- a proportioning control means which is in an operative communication with the micro-diaphragm pump;

wherein the micro-diaphragm pump and the reservoir are combined to form one constructional element exchangeably connected to an actuator module in one of a microsystem technology and hybrid technology; and

- wherein at least two of the proportioning controls means, a display, and an operating means are accommodated on a joint printed-circuit board.

97. The system according to claim 96, wherein the printed-circuit board is disposed in a middle region of the actuator module.

98. A microproportioning system, comprising:

- a reservoir;
- a micro-diaphragm pump having an entrance connected to the reservoir;
- a proportioning port connected to an exit of the micro-diaphragm pump; and

- a proportioning control means which is in an operative communication with the micro-diaphragm pump;
- wherein the micro-diaphragm pump and the reservoir are combined to form one constructional element exchangeably connected to an actuator module in one of a microsystem technology and hybrid technology; and
- wherein a power supply is accomodated in a head region of the actuator module.

99. A microproportioning system, comprising:

- a reservoir;
- a micro-diaphragm pump having an entrance connected to the reservoir;
- a proportioning port connected to an exit of the micro-diaphragm pump; and
- a proportioning control means operationally communicating with micro-diaphragm pump for controlling operation of the micro-

diaphragm pump in one of two opposite pumping directions to thereby control displacement of an auxiliary liquid column from the reservoir for suction of liquid through the proportioning port and an expulsion of liquid from the proportioning port;

- wherein the proportioning control means controls a proportioned volume by controlling the displacement of the auxiliary liquid column along a distance between two sensors which are in an operative communication with the proportioning control means,
- wherein the distance between the two sensor corresponds to the proportioned volume and is adjustable one of manually and by a mechanical drive, and the two sensors detect meniscus of the auxiliary liquid column along a displacement length, and
- wherein the mechanical drive includes a screw having a servo-drive and a screw nut, with one of the two sensors being mounted on the screw.

100. A microproportioning system, comprising:

- a reservoir with a to-be-metered liquid;

- a micro-diaphragm pump having an entrance connected to the reservoir;
- an open jet proportioner having an entrance connected to an exit of the micro-diaphragm pump;
- a proportioning port connected to an exit of the open jet proportioner; and
- a proportioning control means operatively communicating with the micro-diaphragm pump and the open-jet proportioner,
- wherein the reservoir is provided with at least one of cooling means and heat insulation for the to-be-metered liquid.

Claim 99 — selected from the group

101. A microproportioning system, comprising:

- a reservoir with a to-be-metered liquid;
- a micro-diaphragm pump having an entrance connected to the reservoir;
- an open jet proportioner having an entrance connected to an exit of the micro-diaphragm pump;

a proportioning port connected to an exit of the open jet proportioner;

- a proportioning control means operatively communicating with the micro-diaphragm pump and the open-jet proportioner; and
- means provided at least in one of the micro-diaphragm pump, the open jet proportioner, and connecting lines for heating the to-be-metered liquid.

102. A microproportioning system comprising:

- a reservoir with a to-be-metered liquid;
- a micro-diaphragm pump having an entrance connected to the reservoir;
- an open jet proportioner having an entrance connected to an exit of the micro-diaphragm pump;
- a proportioning port connected to an exit of the open jet proportioner; and

a proportioning control means operatively communicating with the micro-diaphragm pump and the open-jet proportioner.

103. The system according to claim 102, wherein the proportioning control means, for filling the open jet proportioner with the liquid from the reservoir, places the open jet proportioner in an non-operative state, and controls the micro-diaphragm pump so that it pumps the liquid in a first direction from the reservoir into the open jet proportioner.

104. The system according to claim 102, wherein the micro-diaphragm pump is capable of pumping liquid in a first direction in which it pumps liquid from the reservoir, and in a second direction in which it pumps liquid in the reservoir, and wherein for filing the open jet proportioner, the micro-diaphragm pump, and the reservoir at least partially with liquid through the proportioning port, the proportioning control means places the open jet proportioner in a non-operative state, and actuates the micro-diaphragm pump so that it is capable of pumping liquid in the second direction opposite the first direction.

105. The system according to claim 102, wherein the proportioning control means places the micro-diaphragm pump into a non-operative state for delivery of liquid from the proportioning port in form of an open jet.

106. The system according to claim 105, wherein the proportioning control means places the micro-diaphragm pump into an non-operative state for delivery of liquid in form of an open jet.

107. The system according to claim 105, wherein the proportioning control means controls a volume being proportioned for delivery in form of an open jet by controlling a displacement volume of the open-jet proportioner.

108. The system according to claim 105, wherein the proportioning control controls a volume being proportioned for delivery in form of open jet by controlling one of a stroke volume and stroke volumes of the micro-diaphragm pump when filling the open-jet proportioner.

109. The system according to claim 102, wherein the proportioning control means places the open jet proportioner in a non-operative state, and

controls the micro-diaphragm pump so that it pumps liquid out of the proportioning port, draining the proportioning port.

110. The system according to claim 109, wherein the proportioning control means controls a volume being proportioned of the liquid being drained by controlling one of stroke volume and stroke volumes of the micro-diaphragm pump.

111. The system according to claim 102, wherein the proportioning control means controls displacement of an auxiliary liquid column from the reservoir for effecting one of the suction of liquid via the proportioning port and expulsion of liquid from the proportioning port by controlling operation of the micro-diaphragm pump in one of first direction in which the micro-diaphragm pump pumps liquid from the reservoir, and second direction opposite to the first direction, and by placing the open-jet proportioner into a non-operative position thereof.

112. The system according to claim 111 wherein the proportioning control means controls a volume of liquid being proportioned when ~~of the liquid~~ being one of

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drawn in and expelled by controlling one of stroke volume and stroke volumes of the micro-diaphragm pump.

113. The system according to claim 102, wherein at least two of the micro-diaphragm pump, the open jet proportioner, the reservoir, and proportioning control means are combined to form one constructional element in one of microsystem technology or hybrid technology.

114. A microproportioning system including

- a reservoir with a to-be-metered liquid;
- at least one of a micro-diaphragm pump having an entrance connected to the reservoir and an open jet proportioner having an entrance connected to one of an exit of the micro-diaphragm pump and the reservoir;
- a proportioning port connected to one of an exit of the micro-diaphragm pump and an exit of the open jet proportioner;
- a proportioning control means operative by communicating with at least one micro-diaphragm pump and an open jet proportioner; and

wherein at least one of a micro-diaphragm pump and an open jet proportioner and the reservoir are combined to form one constructional element exchangeably connected to an actuator module in one of microsystem technology and hybrid technology.

115. The system according to claim 114, wherein the proportioning control means controls a volume being proportioned by controlling a stroke volume of the micro-diaphragm pump.

116. The system according to claim 114, wherein the proportioning control means is connected to a sensor for detection of meniscus of the liquid at the beginning of a displacement length of the liquid for adjustment of an initial position for displacement of a liquid column.

117. The system according to claim 116, wherein the sensor is associated with a dispensing tube for the liquid.

118. The system according to claim 117, wherein the dispensing tube is connected to a constructional element.

119. The system according to claim 118, wherein the constructional element is exchangeably connected to a base region of an actuator module.

120. The system according to claim 119, wherein the proportioning control means is permanently connected to the actuator module, and the constructional element is separably connected to the proportioning control means by an electric contact.

121. The system according to claim 119, wherein a sensor is permanently connected to the actuator module.

122. The system according to claim 114, wherein at least one of the proportioning control means, display, and operating means is accommodated on a joint printed-circuit board.

123. The system according to claim 122, wherein the printed-circuit board is disposed in a middle region of the actuator module.

124. The system according to claim 119, wherein a power supply is accommodated in a head region of the actuator module.

125. A microproportioning system, comprising.

- a reservoir with an auxiliary liquid;
- a micro-diaphragm pump having an entrance connected to the reservoir;

- a proportioning port connected to an exit of the micro-diaphragm pump; and
- a proportioning control means operatively communicating with the micro-diaphragm pump for controlling displacement of an auxiliary liquid column from the reservoir for effecting one of suction of the liquid through the proportioning port and expulsion of liquid from the proportioning port by controlling an operation of the micro-diaphragm pump in one of first direction in which the micro-diaphragm pump pumps the liquid from the reservoir, and second opposite direction.

126. The system according to claim 125, wherein the proportioning control means controls a volume being proportioned by controlling a stroke volume of the micro-diaphragm pump.

127. The system according to claim 125, wherein the proportioning control means is connected to sensors for detection of meniscus of the liquid at beginning of a displacement length of the liquid for adjustment of an initial position for displacement of an auxiliary liquid column.

128. The system according to claim 126, where the proportioning control means determines the volume being proportioned on basis of a calibration of the stroke volume that it establishes by displacing an auxiliary liquid column by the micro-diaphragm pump along with a calibration length between two sensors operatively connected with the proportioning control means for detection of meniscus of an auxiliary liquid column.

129. The system according to claim 125 wherein at least two of the micro-diaphragm pump, the reservoir, and the proportioning control means are combined to form a constructional element in one of microsystem technology and hybrid technology.

130. The system according to claim 102, wherein the reservoir is precharged with liquid.

131. The system according to claim 102, wherein the reservoir has a capillary balance system.

132. The system according to claim 102, wherein the proportioning port has a nozzle shape.

133. The system according to claim 102, wherein the proportioning port is formed at an exchangeable pipette tip.

134. The system according to claim 102, wherein there is provided a constructional element exchangeably connected to an actuator module.

135. The system according to claim 102, wherein the reservoir is connected to an entrance of the open jet proportioner via a feeding capillary.

136. The system according to claim 102, further comprising one of mechanical closure and fluid-based closure between the reservoir and the proportioning port.

137. The system according to claim 102, comprising several ducts having one of a joint reservoir and several reservoirs.

138. The system according to claim 102, formed as a portable unit.

In the Abstract

Cancel the abstract presently pending and add a new Abstract of the Disclosure as follows: